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Empathy, burnout and the use of gut feeling: a cross-sectional survey of general practitioners

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Empathy, burnout and the use of gut feeling: a cross-sectional survey of general practitioners

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ABSTRACT

Objective: Patients' and relatives' concerns are likely triggers of physicians' gut feelings. Gut feeling is particularly important in diagnosis of serious low-incidence diseases in primary care. Therefore, the aim of this study was to examine whether empathy, i.e. the ability to understand what another person is experiencing, relates to general practitioners' (GPs') use of gut feelings. Since empathy is associated with burnout, we also examined whether the hypothesised influence of empathy on gut feeling use is dependent on level of burnout.

Design: Cross-sectional questionnaire survey. Participants completed the Jefferson Scale of Physician Empathy and The Maslach Burnout Inventory.

Setting: Primary care.

Participants: 588 active GPs in Central Denmark Region (response rate=70%)

Primary outcome measure: Self-reported use of gut feelings in clinical practice.

Results: GPs who scored in the highest quartile of the empathy scale had fourfold the odds of increased use of gut feelings compared with GPs in the lowest empathy quartile (OR = 3.99, 95% CI = 2.51-6.34) when adjusting for the influence of possible confounders. Burnout was not statistically significantly associated with use of gut feelings (OR = 1.29, 95% CI = 0.90-1.83), and no significant interaction effects between empathy and burnout were revealed.

Conclusions: Physician empathy, but not burnout, was strongly associated with use of gut feelings in primary care. As preliminary results suggest that gut feelings have diagnostic value, these findings highlight the importance of incorporating empathy and interpersonal skills into medical training to increase sensitivity to patient concern and thereby increase the use and reliability of gut feeling.

STRENGTHS AND LIMITATIONS OF THIS STUDY

- Focus on primary care where diagnosis of serious low-incidence diseases is one of the challenges.
- Use of validated scales for measuring physician empathy and burnout.
- High response rate.
- The cross-sectional design makes causality difficult to determine.
- Inclusion of hard-to-measure variables, such as physician empathy and use of gut feelings.

MeSH keywords: Clinical decision-making, Early diagnosis, Empathy, General practice, Self-report

INTRODUCTION

General practitioners (GPs) sometimes base clinical decisions on their intuition or gut feelings. A limited number of studies have examined the diagnostic value of gut feelings and have shown significant and promising results. One study found a sensitivity of GPs' gut feelings on 62% and a specificity on 97% regarding serious infections in children.[1] Two other studies have reported positive predictive values (PPVs) of GPs' gut feelings on 3-35% concerning diagnoses of cancer.[2, 3] These PPVs are comparable or substantial higher than the PPVs of most cancer alarm symptoms presented in primary care, which are mostly below 3%.[4]

Stolper et al. described two types of gut feeling in GPs: a "sense of alarm" defined as an uneasy feeling indicating concerns about a possible adverse outcome, even though specific indications are lacking and a "sense of reassurance" defined as a feeling of security about the management of a patient's problem, even though the diagnosis may be uncertain.[5, 6] In models of clinical cognition, gut feelings are often seen as a form of intuition or non-analytical reasoning,[7] because the sense that something may be wrong with the patient often lacks objective arguments.[6] There seems to be consensus on Stolper's definition on gut feelings in general practice, but nonetheless the more analytical interpretation of signs and symptoms is sometimes mixed with gut feeling. For instance, in one study, alarm symptoms such as palpable tumours were reported to be triggers of gut feelings.[2] To our knowledge, only one study has separated gut feelings from the deliberate, cognitive evaluation of the patient's symptoms.[1] This study of children examined for serious infections found that parents' worry was an important trigger of GPs' gut feelings.

It varies greatly to what extent the individual GP uses gut feelings,[2] and this might suggest that the acknowledgement and use of gut feelings relate to the GP's personality.[6] Research has shown that gut feelings often raise affective bodily sensations in the GP such as sensations in the abdomen or heart, and these affective responses could be triggered by sensitivity towards the emotional state of the patient or her

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relatives.[8] On this background, physician empathy, i.e. the ability to understand what another individual is experiencing, might be a determinant of the use of gut feelings.

Some GPs will congenitally be less empathic than others, but one group of GPs may initially have possessed good empathic skills which have then later on been reduced due to burnout, which has been referred to as an “empathy killer”.[9] Burnout is a psychological construct defined as a prolonged response to chronic emotional and interpersonal stressors on the job and is characterized by emotional exhaustion, depersonalization (cynicism) and a subjective experience of decreased personal accomplishment.[10] Burnout seems to be associated with empathy in a complex, bidirectional manner.[9] Thus, there is evidence that GPs with high patient-centred orientation find their work more stressful,[11] but also that high capacities for perspective taking and empathic concern can protect against burnout.[12] There is evidence to support that when burnout has emerged it is inversely associated with empathy. For instance, burned-out medical students appear less likely to provide care for the medically underserved [13] and are less able to listen empathically.[14]

On this background, we hypothesised that GPs who report high levels of empathy report higher use of gut feelings in their clinical work and that this hypothesised effect of empathy on use of gut feelings depends on the presence of burnout.

METHODS

Setting

GPs in Denmark are independent contractors with the regional health authorities. The patient list size is on average 1550 patients per GP including children. All Danish citizens are assigned a unique personal identification number, the civil registration number (CRN), by which information from numerous nationwide registers in Denmark can be linked.[15]

Study population

In January 2012, all 835 active GPs in Central Denmark Region were invited to participate in a survey on job satisfaction ("the GP profile"). GPs were identified by the Regional Registry of Health Providers. Non-respondents were sent a reminder after four and thirteen weeks and GPs were remunerated 50€ for responding.

Questionnaires – independent variables and effect modifier

Empathy was assessed by the Jefferson Scale of Physician Empathy consisting of 20 items scored on a 7-point Likert scale.[16] Higher sum-scores indicate higher levels of empathy. In this study, the empathy sum-score was categorized into four groups based on its quartiles.

Burnout was assessed by The Maslach Burnout Inventory Human-Services-Survey (MBI-HSS) [10]. The MBI-HSS has been used in more than 90% of empirical studies of burnout in the world.[17] The scale has been translated into Danish following standardised procedures. The MBI-HSS consists of 22 items scored on a 7-point Likert scale constituting three subscales: 1) emotional exhaustion (9 items), 2) depersonalisation (5 items), and 3) personal accomplishment (8 items). Each subscale score is categorised as low or high based on normative population score.[10] A high level of emotional exhaustion is defined as a score >26, and a

high level of depersonalisation is defined as a score >9. Low personal accomplishment is defined as a score <34. Burnout was defined as a high score on the emotional exhaustion subscale and/or a high score on the depersonalisation subscale.[10]

Single item – the outcome variable

One question assessed to which degree the GP used gut feelings in his clinical activities and the response was graded on a 5-point Likert scale from “not at all” to “a very high degree”. The question was inspired by a former study on use of gut feelings.[18]

According to Danish law the study was not submitted to an ethical committee since questionnaire surveys do not require an ethical approval. The study was approved by the Danish Data Protection Agency (journal number 2011-41-6609).

Analysis

The outcome variable (use of gut feelings) was assessed on an ordinal scale (from not at all to a very high degree). After confirming that the proportional odds assumption was met, ordered logistic regression was used to examine associations between empathy, burnout dimensions and use of gut feelings. Associations were calculated as odd ratios (ORs). To test for an association between empathy and use of gut feeling and whether the association was dependent on presence of burnout (i.e. interaction effect), one hierarchical ordered logistic regression analysis was performed. In the first step (model 1), sex, age, practice organisation and burnout were included as covariates. In the second step (model 2), the interaction variables between empathy quartiles and burnout were included. To assist interpretation of results, predicted probabilities for empathy quartiles were calculated. As a sensitivity analysis, three separate hierarchical ordered logistic regression analyses were performed adjusting for the three burnout dimensions (emotional exhaustion, depersonalisation and reduced personal accomplishment) individually.

We handled missing data by listwise deletion. The 95% confidence intervals (95% CI) for ratios were calculated and p-values of 5% or less were considered statistically significant. Data was analysed using STATA 13.

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RESULTS

Among the 835 invited GPs, 588 (70%) completed the question about use of gut feelings in their clinical practice. Among the 588 included GPs, there was a slight predominance of male GPs (52%) and the majority of GPs worked in group practices (76%). One GP reported not to use gut feelings and this GP was added to the 20 (3%) GPs who reported that they used gut feelings to a low degree. Respectively 254 (43%), 211 (36%) and 102 (17%) reported that they used gut feelings to some degree, a high degree and a very high degree. Sociodemographic characteristics of the 588 included GPs are depicted in Table 1.

Table 1. Demographic characteristics and scores on burnout dimensions and empathy by gut feeling categories

	All N = 588 (100%)	Use of gut feelings:			
		To a low degree N = 21 (3.6%)	To some degree N = 254 (43.2%)	To a high degree N = 211 (35.9%)	To a very high degree N = 102 (17.3%)
	N (%)	N (%)	N (%)	N (%)	N (%)
Sex					
Female	278 (47.3)	5 (23.8)	126 (50.2)	94 (44.8)	53 (52.0)
Male	306 (52.0)	16 (76.2)	125 (49.8)	116 (55.2)	49 (48.0)
Practice organisation					
Group	445 (75.7)	15 (71.4)	207 (81.5)	157 (74.4)	66 (64.7)
Solo	143 (24.3)	6 (28.6)	47 (18.5)	54 (25.6)	36 (35.3)
Age of GPs (years)					
< 40	39 (6.6)	2 (9.5)	19 (7.5)	14 (6.6)	4 (3.9)
40-49	183 (31.1)	3 (14.3)	75 (29.5)	66 (31.3)	39 (38.2)
50-59	226 (38.4)	9 (42.9)	98 (38.6)	78 (37.0)	41 (40.2)
≥ 60	138 (23.5)	7 (33.3)	61 (24.0)	52 (24.6)	18 (17.7)
Empathy					
Lowest quartile	154 (26.2)	12 (57.1)	83 (32.7)	46 (21.8)	13 (12.8)
2 nd quartile	145 (24.7)	4 (19.1)	70 (27.6)	49 (23.2)	22 (21.6)
3 rd quartile	129 (21.9)	0 (0.0)	53 (20.9)	51 (24.2)	25 (24.5)
Highest quartile	129 (21.9)	3 (14.3)	35 (13.8)	53 (25.1)	38 (37.3)
Burnout					
No burnout	441 (75.0)	20 (95.2)	192 (75.6)	146 (69.2)	83 (81.4)
Burnout	147 (25.0)	1 (4.8)	62 (24.4)	65 (30.8)	19 (18.6)
Emotional exhaustion					
Low	479 (81.5)	19 (90.5)	212 (83.5)	164 (77.7)	84 (82.4)
High	102 (17.4)	1 (4.8)	39 (15.4)	46 (21.8)	16 (15.7)
Depersonalisation					
Low	503 (85.5)	19 (90.5)	219 (86.2)	172 (81.5)	93 (91.2)
High	81 (13.8)	1 (4.8)	33 (13.0)	38 (18.0)	9 (8.8)
Personal accomplishment					
High	377 (64.1)	14 (66.7)	157 (61.8)	133 (63.0)	73 (71.6)
Low	201 (34.2)	6 (28.6)	92 (36.2)	76 (36.0)	27 (26.5)

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The empathy sum-score correlated negatively with emotional exhaustion ($r = -0.13$; $p = 0.003$), depersonalisation ($r = -0.24$; $p < 0.001$) and positively with personal accomplishment ($r = 0.43$; $p < 0.001$).

Table 2 depicts associations between gut feelings and sociodemographic factors, the three burnout dimensions and empathy. A linear relationship between empathy and use of gut feelings was revealed when adjusting for sex, age, practice organisation and burnout. Thus, compared with GPs in the lowest empathy quartile, GPs in the highest quartile had fourfold the likelihood of increased use of gut feelings ($OR_{\text{model 1}} = 3.99$, 95% CI = 2.51-6.34).

Figure 1 shows the predicted probabilities of being in each of the four gut feeling categories in relation to level of empathy score. The pattern of those in the lowest and highest quartiles of the empathy sum-score is opposite. Thus, 50% of those in the lowest quartile of the empathy sum-score uses gut feelings to a low degree and only 13% of participants in this group uses gut feelings to a very high degree. Opposite this, only 8% of those in the highest quartile of the empathy sum-score uses gut feelings to a low degree whereas 39% of this group uses gut feelings to a very high degree.

Burnout was not significantly associated with use of gut feelings ($OR_{\text{model 1}} = 1.29$, 95% CI = 0.90-1.83) and the results did not reveal a significant interaction between burnout and empathy on the use of gut feelings (Table 2). Including each of the three burnout dimensions individually in the sensitivity analysis did not reveal a main effect of any of the three burnout dimensions on use of gut feelings (data not shown; OR_{high} emotional exhaustion versus low = 1.41, 95% CI = 0.94-2.11; OR_{high} depersonalisation versus low = 1.32, 95% CI = 0.89-2.04; OR_{low} personal accomplishment versus high = 1.21, 95% CI = 0.86-1.72). Including each of the three burnout dimensions individually did not either support a moderating effect of any of the three burnout dimensions (data not shown; p-values 0.336-0.923).

Solo GPs had significantly greater likelihood of increased use of gut feelings compared to GPs in group practices ($OR_{\text{model 2}} = 1.86$, 95% CI = 1.25-2.75).

Table 2. Summary of a hierarchical ordered logistic regression analysis with gut feeling categories used as outcome

	Model 1 ¹		Model 2 ²	
	OR (95% CI)	P-value	OR (95% CI)	P-value
Sex				
Males versus females	0.88 (0.63-1.24)	0.473	0.87 (0.62-1.23)	0.435
Age	0.98 (0.96-1.00)	0.101	0.98 (0.96-1.00)	0.107
Practice organisation				
Solo practice versus group practice	1.82 (1.23-2.69)	0.003	1.86 (1.25-2.75)	0.002
Empathy ³				
2 nd quartile versus 1 st	1.76 (1.13-2.74)	0.012	1.71 (0.99-2.94)	0.054
3 rd quartile versus 1 st	2.47 (1.57-3.89)	<0.001	2.29 (1.33-3.93)	0.003
4 th quartile versus 1 st	3.99 (2.51-6.34)	<0.001	4.12 (2.38-7.11)	<0.001
Burnout				
Burned-out versus not burned-out	1.29 (0.90-1.83)	0.165	1.22 (0.63-2.34)	0.555
Empathy quartiles x burnout				
2 nd quartile versus 1 st x burnout			1.10 (0.43-2.83)	0.840
3 rd quartile versus 1 st x burnout			1.35 (0.50-3.66)	0.560
4 th quartile versus 1 st x burnout			0.84 (0.30-2.30)	0.728

¹ Model 1 included sex, age, practice organisation and burnout as covariates; ² Model 2 included the same covariates as model 1 besides interaction variables between empathy quartiles and burnout; ³ Empathy quartiles were represented as three dummy variables with 1st (lowest) quartile serving as the reference group.

DISCUSSION

Main findings

This study supported our hypothesis with a robust linear association between increased empathy score and increased use of gut feelings, even when adjusting for the influence of possible confounders such as sex, age, practice organisation and burnout. Compared with GPs in the lowest empathy quartile, GPs in the highest quartile reported fourfold increased use of gut feelings. The predicted probability of using gut feelings to a very high degree was 28% for GPs scoring in the highest quartile of the empathy scale and only 9% of GPs scoring in the lowest quartile of the scale. The results of the study did neither support an association between burnout and use of gut feelings nor that the influence of empathy on use of gut feelings was significantly associated with burnout.

Strengths and limitations

One strength of the present study is the use of validated scales for measuring physician empathy and burnout. Moreover, the response rate was relatively high. One limitation of the study is the cross-sectional design based on which causality cannot be determined. The ability to display empathy is not easily measurable by self-report, and the Jefferson Scale of Physician Empathy [16] actually assesses the physician's attitude to empathy more than the actual empathic ability. To our knowledge, it has not been examined whether the physician's attitude to empathy correlates with his/her actual capacity to understand what another person is experiencing. Therefore, we cannot exclude that the results of this study reveal an association between a positive attitude to empathy and a positive attitude to use of gut feelings rather than an association between empathic abilities and use of gut feelings. Furthermore, the assessment of use of gut feelings was based on a single item, which was developed for use in a previous study.[18] The item was based on a consensus statement on gut feelings obtained by Stolper et al. [5] in a Delphi procedure and pilot-tested, but not further validated. After our data was collected, a promising 11-item gut feelings questionnaire was published.[32]

Comparisons with existing literature

Previous findings have revealed that patients’ emotional state is a trigger of gut feelings in physicians. One study showed that gut feelings among GPs exposed to children with possible serious infections were often triggered by parents’ expression of concern.[1] Likewise, one qualitative study reported that the emotional signals disclosed during patients’ presentation of symptoms, for instance the way the patients sat or spoke, were triggers of gut feelings.[6] The results of this study consolidate these findings and suggest that patient worry may trigger gut feelings especially in GPs who have higher levels of empathy.

A limited number of studies have supported the diagnostic values of GPs’ gut feelings.[1-3] On this basis, it has been suggested that medical students should be provided with cases that stimulate their use of intuition and be exposed to teaching which encourage instinctive clinical judgment in patient management and diagnosis.[19] Based on the findings of studies showing that gut feelings are often triggered by patient worry and the findings of the present study revealing an association between physician empathy and use of gut feelings, we suggest that the role of emotions in the doctor-patient relationship is emphasised within the medical school curriculum. It has been suggested that medical education seems to encourage students not to acknowledge emotions of patients.[20] This view is supported by studies showing that the most common physician responses to patients’ expression of worry were biomedical questions, medical explanations and reassurance,[21] and that when patients express negative emotions, the physicians’ responses were directed toward the emotional expression in only 32% of the cases.[22] One challenge with patient worry is that the concerns are often expressed indirectly through cues or clues, which have to be read by the clinician.[23] It would be relevant to examine whether increased sensitivity towards such clues could improve the diagnostic process and help clarify under which circumstances patient worry and patient intuition has credibility and significance.[24] Thus, studies have shown that when physicians respond to patients’ expressions of negative emotions with statements that allow for or explicitly encourage further discussion of emotion, then clinically relevant information is often elicited.[22] Furthermore, a review concluded that opening up for patient emotions and providing empathic responses may be associated with

positive patient outcomes such as reduced distress and increased patient adherence, co-operation and partnership building.[23]

We found no significant association between burnout or any of the three burnout dimensions and use of gut feelings. Certainly, burned-out GPs had approximately 30% increased likelihood of using gut feelings to a high level compared to GPs who were not burned-out, but the confidence intervals were wide (0.90 to 1.83) suggesting some inconsistency concerning whether burnout increases or decreases use of gut feelings in our sample. In line with this, the consequences of burnout for GPs' interpersonal skills are controversial and findings are mixed.[25, 26] Thus, the results of one study revealed no associations between GPs' level of depersonalisation and their patient-rated interpersonal skills or observed patient-centeredness.[27] Another study revealed that GPs with high levels of exhaustion and depersonalisation were more likely to provide opportunities to discuss mental health problems in the consultation compared to GPs with low levels of exhaustion and depersonalisation.[28] Contrary to this, a third study revealed that burned-out medical students were more likely to report engagement in unprofessional behaviours than those without burnout.[13] A fourth study showed that exhausted female GPs had shorter consultations and were less patient-centred than non-exhausted female GPs whereas exhausted male GPs had longer consultations and were more patient-centred than non-exhausted male GPs.[29] The findings of the present study revealing that empathy, but not burnout, is associated with the use of gut feelings might suggest that the use of gut feelings among GPs is more dependent on personality traits than on the current state of the physician. This agrees to results of a focus group study in which GPs themselves experienced that personality traits such as the ability to tolerate risk and uncertainty influenced the way that they handled gut feelings.[6] A link between personality traits and use of gut feelings raises the question about whether the use of gut feelings can be taught or is an innate ability.[19] Although gut feelings appear to relate to certain personality traits, it is important to stress that the one condition may not be responsible for the other and that the link may not be maintained in the future if teaching of gut feeling was included in the medical school curriculum. Medical educators have suggested that experienced physicians help early-stage physicians to become

aware of their gut feelings by sharing their own gut feeling experiences and by encouraging them to be attentive to their own experiences and analyse them retrospectively.[30]

We did not find that age of the GP was associated with use of gut feelings. This contradicts with the findings of other studies in which gut feeling was found either more frequently in less experienced physicians compared to senior physicians [1] or more frequently by experienced than by less experienced physicians.[31] Compared to these studies, the participants in our study might have been more homogeneous since virtually all physicians in our study were specialists in general medicine and as such quite experienced. Moreover, we examined used of gut feelings in general whereas the other two studies examined the use of gut feeling with reference to specific patient cases. Gut feeling has been described as an intuitive feeling that results from unconscious reasoning and comes with experience.[8] Therefore, the results showing less use of gut feeling with increasing experience may appear peculiar.[1] Meanwhile, as stated by the authors, the triggers of a gut feeling may be processed as part of the conscious diagnostic reasoning in the experienced physician and as pre-conscious reasoning in the less experienced physician. The sensitivity and specificity of gut feeling was the same in the experienced and less experienced physicians [1] and more research is needed to determine both the understanding, use and precision of gut feeling in experienced and less experienced physicians.

Solo GPs had significantly greater likelihood of increased use of gut feelings compared to GPs in group practices. This finding may reflect that familiarity with the patient is often reported to increase reliance on gut feelings.[6] Since patient lists are sometimes shared among GPs in group practices, their familiarity with the individual patient may be reduced compared to solo GPs who often have long-lasting relationships with their patients.

Conclusions and implications

There was a positive association between physician empathy and reported use of gut feelings in primary care. Burnout was neither associated with use of gut feelings nor did it act as an effect moderator on the

relationship between empathy and use of gut feelings. Patient concern is presumably one of the triggers of gut feelings and more research is needed to determine under which circumstances patient worries can be used as a reliable tool in the diagnostic process. The use of gut feelings, empathy and interpersonal skills should be incorporated into specialty training to support the use of patient emotions as a deliberate tool in the diagnostic process.

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COMPETING INTERESTS

None declared.

CONTRIBUTIONS

AFP, MLI and PV conceptualized the study. AFP analyzed the data and MLI and PV took part in the interpretation of results. AFP wrote the original draft and AFP, MLI and PV contributed to the editing and reviewing of the draft.

DATA SHARING STATEMENT

Requests for access to data should be addressed to the corresponding author.

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LEGEND TO FIGURE 1:

The predicted share of GPs in the four gut feeling categories (use of gut feeling to a low, some, high or very high degree) based on their empathy score divided into quartiles.

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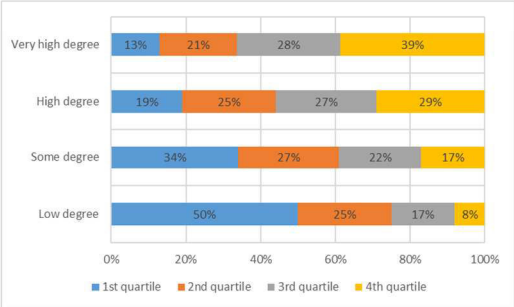
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Figure 1: The predicted share of GPs in the four gut feeling categories (use of gut feeling to a low, some, high or very high degree) based on their empathy score divided into quartiles.



The predicted share of GPs in the four gut feeling categories (use of gut feeling to a low, some, high or very high degree) based on their empathy score divided into quartiles.

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STROBE 2007 (v4) Statement—Checklist of items that should be included in reports of *cross-sectional studies*

Section/Topic	Item #	Recommendation	Reported on page #
Title and abstract	1	(a) Indicate the study’s design with a commonly used term in the title or the abstract	1
		(b) Provide in the abstract an informative and balanced summary of what was done and what was found	1
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	3-4
Objectives	3	State specific objectives, including any prespecified hypotheses	4
Methods			
Study design	4	Present key elements of study design early in the paper	1
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	5
Participants	6	(a) Give the eligibility criteria, and the sources and methods of selection of participants	5
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	5-6
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	5-6
Bias	9	Describe any efforts to address potential sources of bias	Na
Study size	10	Explain how the study size was arrived at	5
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	Na
Statistical methods	12	(a) Describe all statistical methods, including those used to control for confounding	6-7
		(b) Describe any methods used to examine subgroups and interactions	6-7
		(c) Explain how missing data were addressed	7
		(d) If applicable, describe analytical methods taking account of sampling strategy	Na
		(e) Describe any sensitivity analyses	6
Results			

Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	8
		(b) Give reasons for non-participation at each stage	8
		(c) Consider use of a flow diagram	Na
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	9
		(b) Indicate number of participants with missing data for each variable of interest	9
Outcome data	15*	Report numbers of outcome events or summary measures	9
Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	12
		(b) Report category boundaries when continuous variables were categorized	Na
		(c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	Figure 1
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	11
Discussion			
Key results	18	Summarise key results with reference to study objectives	14
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	14
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	15-17
Generalisability	21	Discuss the generalisability (external validity) of the study results	15-17
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	18

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at <http://www.plosmedicine.org/>, Annals of Internal Medicine at <http://www.annals.org/>, and Epidemiology at <http://www.epidem.com/>). Information on the STROBE Initiative is available at www.strobe-statement.org.

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Empathy, burnout and the use of gut feeling: a cross-sectional survey of general practitioners

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ABSTRACT

Objective: Patients' and relatives' concerns are likely triggers of physicians' gut feelings. Gut feeling is particularly important in diagnosis of serious low-incidence diseases in primary care. Therefore, the aim of this study was to examine whether empathy, i.e. the ability to understand what another person is experiencing, relates to general practitioners' (GPs') use of gut feelings. Since empathy is associated with burnout, we also examined whether the hypothesised influence of empathy on gut feeling use is dependent on level of burnout.

Design: Cross-sectional questionnaire survey. Participants completed the Jefferson Scale of Physician Empathy and The Maslach Burnout Inventory.

Setting: Primary care.

Participants: 588 active GPs in Central Denmark Region (response rate=70%)

Primary outcome measure: Self-reported use of gut feelings in clinical practice.

Results: GPs who scored in the highest quartile of the empathy scale had fourfold the odds of increased use of gut feelings compared with GPs in the lowest empathy quartile (OR = 3.99, 95% CI = 2.51-6.34) when adjusting for the influence of possible confounders. Burnout was not statistically significantly associated with use of gut feelings (OR = 1.29, 95% CI = 0.90-1.83), and no significant interaction effects between empathy and burnout were revealed.

Conclusions: Physician empathy, but not burnout, was strongly associated with use of gut feelings in primary care. As preliminary results suggest that gut feelings have diagnostic value, these findings highlight the importance of incorporating empathy and interpersonal skills into medical training to increase sensitivity to patient concern and thereby increase the use and reliability of gut feeling.

STRENGTHS AND LIMITATIONS OF THIS STUDY

- Focus on primary care where diagnosis of serious low-incidence diseases is one of the challenges.
- Use of validated scales for measuring physician empathy and burnout.
- High response rate.
- The cross-sectional design makes causality difficult to determine.
- Inclusion of hard-to-measure variables, such as physician empathy and use of gut feelings.

MeSH keywords: Clinical decision-making, Early diagnosis, Empathy, General practice, Self-report

INTRODUCTION

General practitioners (GPs) sometimes base clinical decisions on their intuition or gut feelings. A limited number of studies have examined the diagnostic value of gut feelings and have shown significant and promising results. One study found a sensitivity of GPs' gut feelings on 62% and a specificity on 97% regarding serious infections in children.[1] Two other studies have reported positive predictive values (PPVs) of GPs' gut feelings on 3-35% concerning diagnoses of cancer.[2, 3] These PPVs are comparable or substantial higher than the PPVs of most cancer alarm symptoms presented in primary care, which are mostly below 3%.[4]

Stolper et al. described two types of gut feeling in GPs: a "sense of alarm" defined as an uneasy feeling indicating concerns about a possible adverse outcome, even though specific indications are lacking and a "sense of reassurance" defined as a feeling of security about the management of a patient's problem, even though the diagnosis may be uncertain.[5, 6] In models of diagnostic reasoning, intuition and analysis are often described as two modes of cognition, which can be placed at the ends of a continuum.[7] Intuition comprises automatic, unconscious reasoning requiring low effort (system 1 decision-making), whereas analysis comprises controlled, conscious reasoning requiring high effort (system 2 decision-making).[8] There seems to be consensus that gut feelings belong to the intuition end of the reasoning continuum, but the emphasis on lack of specific indications or objective arguments regarding in the sense of alarm as described in the Stolper definition [6] is less clear in studies of gut feelings. For instance, in one study, red flag symptoms such as palpable tumours were reported to be triggers of gut feelings.[2] Moreover, in studies of gut feelings among emergency physicians, potential red flag vital signs were included in assessment of patients.[8, 9] One study of children examined for serious infections explicitly approached gut feelings as an intuitive feeling, which could arise despite that the clinical impression suggests a non-serious illness and found that parents' worry was an important trigger of GPs' gut feelings in children with no red flag symptoms.[1] Thus, parental concern was registered in 33% of cases where gut feeling was

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present despite that the clinical impression was that of a non-serious illness and in only 2% of similar non-serious cases where gut feeling was absent.

It varies greatly to what extent the individual GP uses gut feelings.[2] This might suggest that the use of gut feelings relate to the GP’s personality.[6] Insofar the emotional state of the patient or his/her relatives is a trigger of gut feelings as proposed by the study above, physician empathy might be a determinant of the use of gut feelings. There is disagreement about the definition of empathy. In the medical context, empathy is often considered as a cognitive quality encompassing an understanding of the patient’s experience and concerns and an ability to communicate this understanding and an intention to help.[10] However, in other areas the emotional feeling is the focal point in the definition of empathy and empathy is considered as an effective response to the emotions of others.[11]

Some GPs will congenitally be less empathic than others, but one group of GPs may initially have possessed good empathic skills which have then later on been reduced due to burnout, which has been referred to as an “empathy killer”. [12] Burnout is a psychological construct defined as a prolonged response to chronic emotional and interpersonal stressors on the job and is characterized by emotional exhaustion, depersonalization (cynicism) and a subjective experience of decreased personal accomplishment.[13] Burnout seems to be associated with empathy in a complex, bidirectional manner.[12] Thus, burnout has been associated with low levels of empathy.[14] On the other side, deficits in perspective taking appear to be a risk factor for burnout, whereas increased perspective taking and empathic concern seem to be protective against burnout.[15, 16]

On this background, we hypothesised that GPs who report high levels of empathy report higher use of gut feelings in their clinical work and that this hypothesised effect of empathy on use of gut feelings depends on the presence of burnout.

METHODS

Setting

GPs in Denmark are independent contractors with the regional health authorities. The patient list size is on average 1550 patients per GP including children. All Danish citizens are assigned a unique personal identification number, the civil registration number (CRN), by which information from numerous nationwide registers in Denmark can be linked.[17]

Study population

In January 2012, all 835 active GPs in Central Denmark Region were invited to participate in a survey on job satisfaction ("the GP profile"). GPs were identified by the Regional Registry of Health Providers. Non-respondents were sent a reminder after four and thirteen weeks and GPs were remunerated 50€ for responding. In Denmark, it is customary to compensate doctors for their time when they participate in research projects.

Questionnaires – independent variables and effect modifier

Empathy was assessed by the Jefferson Scale of Physician Empathy (JSPE) consisting of 20 items scored on a 7-point Likert scale.[18] Higher sum-scores indicate higher levels of empathy. In this study, the empathy sum-score was categorized into four groups based on its quartiles.

Burnout was assessed by The Maslach Burnout Inventory Human-Services-Survey (MBI-HSS) [13]. The MBI-HSS has been used in more than 90% of empirical studies of burnout in the world.[19] The scale has been translated into Danish following standardised procedures. The MBI-HSS consists of 22 items scored on a 7-point Likert scale constituting three subscales: 1) emotional exhaustion (9 items), 2) depersonalisation (5 items), and 3) personal accomplishment (8 items). Each subscale score is categorised as low or high based

on normative population score.[13] A high level of emotional exhaustion is defined as a score >26, and a high level of depersonalisation is defined as a score >9. Low personal accomplishment is defined as a score <34. Burnout was defined as a high score on the emotional exhaustion subscale and/or a high score on the depersonalisation subscale.[13]

Both the JSPE and MBI-HSS were translated into Danish in accordance with the WHO guidelines.[20] The translation process included a forward translation and an expert panel back-translation and pilot testing of translated version.

Single item – the outcome variable

A definition of gut feeling, based on Stolper’s work,[21] was included in the questionnaire and was as follows: “a physician’s intuitive feeling that something is wrong with the patient although there is no apparent clinical indications for this, or a physician’s intuitive feeling that the strategy used in relation to the patient is correct, although there is uncertainty about the diagnosis”. The GPs were asked to rate how much they use gut feelings in their daily clinical work and the response was graded on a 5-point Likert scale from “not at all” to “a very high degree”. The question was inspired by a former Danish study on use of gut feelings.[22]

According to Danish law the study was not submitted to an ethical committee since questionnaire surveys do not require an ethical approval. The study was approved by the Danish Data Protection Agency (journal number 2011-41-6609).

Analysis

The outcome variable (use of gut feelings) was assessed on an ordinal scale (from not at all to a very high degree). After confirming that the proportional odds assumption was met, ordered logistic regression was used to examine associations between empathy, burnout dimensions and use of gut feelings. Associations

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4 were calculated as odd ratios (ORs). To test for an association between empathy and use of gut feeling and
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6 whether the association was dependent on presence of burnout (i.e. interaction effect), one hierarchical
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8 ordered logistic regression analysis was performed. In the first step (model 1), sex, age, practice
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10 organisation and burnout were included as covariates. In the second step (model 2), the interaction
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12 variables between empathy quartiles and burnout were included. To assist interpretation of results,
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14 predicted probabilities for empathy quartiles were calculated. As a sensitivity analysis, three separate
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16 hierarchical ordered logistic regression analyses were performed adjusting for the three burnout
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18 dimensions (emotional exhaustion, depersonalisation and reduced personal accomplishment) individually.
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20 We handled missing data by listwise deletion. The 95% confidence intervals (95% CI) for ratios were
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22 calculated and p-values of 5% or less were considered statistically significant. Data was analysed using
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RESULTS

Among the 835 invited GPs, 588 (70%) completed the question about use of gut feelings in their clinical practice. Among the 588 included GPs, there was a slight predominance of male GPs (52%) and the majority of GPs worked in group practices (76%). One GP reported not to use gut feelings and this GP was added to the 20 (3%) GPs who reported that they used gut feelings to a low degree. Respectively 254 (43%), 211 (36%) and 102 (17%) reported that they used gut feelings to some degree, a high degree and a very high degree. Sociodemographic characteristics of the 588 included GPs are depicted in Table 1.

Table 1. Demographic characteristics and scores on burnout dimensions and empathy by gut feeling categories

	All N = 588 (100%)	Use of gut feelings:			
		To a low degree N = 21 (3.6%)	To some degree N = 254 (43.2%)	To a high degree N = 211 (35.9%)	To a very high degree N = 102 (17.3%)
	N (%)	N (%)	N (%)	N (%)	N (%)
Sex					
Female	278 (47.3)	5 (23.8)	126 (50.2)	94 (44.8)	53 (52.0)
Male	306 (52.0)	16 (76.2)	125 (49.8)	116 (55.2)	49 (48.0)
Practice organisation					
Group	445 (75.7)	15 (71.4)	207 (81.5)	157 (74.4)	66 (64.7)
Solo	143 (24.3)	6 (28.6)	47 (18.5)	54 (25.6)	36 (35.3)
Age of GPs (years)					
< 40	39 (6.6)	2 (9.5)	19 (7.5)	14 (6.6)	4 (3.9)
40-49	183 (31.1)	3 (14.3)	75 (29.5)	66 (31.3)	39 (38.2)
50-59	226 (38.4)	9 (42.9)	98 (38.6)	78 (37.0)	41 (40.2)
≥ 60	138 (23.5)	7 (33.3)	61 (24.0)	52 (24.6)	18 (17.7)
Empathy					
Lowest quartile	154 (26.2)	12 (57.1)	83 (32.7)	46 (21.8)	13 (12.8)
2 nd quartile	145 (24.7)	4 (19.1)	70 (27.6)	49 (23.2)	22 (21.6)
3 rd quartile	129 (21.9)	0 (0.0)	53 (20.9)	51 (24.2)	25 (24.5)
Highest quartile	129 (21.9)	3 (14.3)	35 (13.8)	53 (25.1)	38 (37.3)
Burnout					
No burnout	441 (75.0)	20 (95.2)	192 (75.6)	146 (69.2)	83 (81.4)
Burnout	147 (25.0)	1 (4.8)	62 (24.4)	65 (30.8)	19 (18.6)
Emotional exhaustion					
Low	479 (81.5)	19 (90.5)	212 (83.5)	164 (77.7)	84 (82.4)
High	102 (17.4)	1 (4.8)	39 (15.4)	46 (21.8)	16 (15.7)
Depersonalisation					
Low	503 (85.5)	19 (90.5)	219 (86.2)	172 (81.5)	93 (91.2)
High	81 (13.8)	1 (4.8)	33 (13.0)	38 (18.0)	9 (8.8)
Personal accomplishment					
High	377 (64.1)	14 (66.7)	157 (61.8)	133 (63.0)	73 (71.6)
Low	201 (34.2)	6 (28.6)	92 (36.2)	76 (36.0)	27 (26.5)

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The empathy sum-score correlated negatively with emotional exhaustion ($r = -0.13$; $p = 0.003$), depersonalisation ($r = -0.24$; $p < 0.001$) and positively with personal accomplishment ($r = 0.43$; $p < 0.001$).

Table 2 depicts associations between gut feelings and sociodemographic factors, the three burnout dimensions and empathy. A linear relationship between empathy and use of gut feelings was revealed when adjusting for sex, age, practice organisation and burnout. Thus, compared with GPs in the lowest empathy quartile, GPs in the highest quartile had fourfold the likelihood of increased use of gut feelings ($OR_{\text{model 1}} = 3.99$, 95% CI = 2.51-6.34).

Figure 1 shows the predicted probabilities of being in each of the four gut feeling categories in relation to level of empathy score. The pattern of those in the lowest and highest quartiles of the empathy sum-score is opposite. Thus, 50% of those in the lowest quartile of the empathy sum-score uses gut feelings to a low degree and only 13% of participants in this group uses gut feelings to a very high degree. Opposite this, only 8% of those in the highest quartile of the empathy sum-score uses gut feelings to a low degree whereas 39% of this group uses gut feelings to a very high degree.

Burnout was not significantly associated with use of gut feelings ($OR_{\text{model 1}} = 1.29$, 95% CI = 0.90-1.83) and the results did not reveal a significant interaction between burnout and empathy on the use of gut feelings (Table 2). Including each of the three burnout dimensions individually in the sensitivity analysis did not reveal a main effect of any of the three burnout dimensions on use of gut feelings (data not shown; OR_{high} emotional exhaustion versus low = 1.41, 95% CI = 0.94-2.11; OR_{high} depersonalisation versus low = 1.32, 95% CI = 0.89-2.04; OR_{low} personal accomplishment versus high = 1.21, 95% CI = 0.86-1.72). Including each of the three burnout dimensions individually did not either support a moderating effect of any of the three burnout dimensions (data not shown; p-values 0.336-0.923).

Solo GPs had significantly greater likelihood of increased use of gut feelings compared to GPs in group practices ($OR_{\text{model 2}} = 1.86$, 95% CI = 1.25-2.75).

Table 2. Summary of a hierarchical ordered logistic regression analysis with gut feeling categories used as outcome

	Model 1 ¹		Model 2 ²	
	OR (95% CI)	P-value	OR (95% CI)	P-value
Sex				
Males versus females	0.88 (0.63-1.24)	0.473	0.87 (0.62-1.23)	0.435
Age	0.98 (0.96-1.00)	0.101	0.98 (0.96-1.00)	0.107
Practice organisation				
Solo practice versus group practice	1.82 (1.23-2.69)	0.003	1.86 (1.25-2.75)	0.002
Empathy ³				
2 nd quartile versus 1 st	1.76 (1.13-2.74)	0.012	1.71 (0.99-2.94)	0.054
3 rd quartile versus 1 st	2.47 (1.57-3.89)	<0.001	2.29 (1.33-3.93)	0.003
4 th quartile versus 1 st	3.99 (2.51-6.34)	<0.001	4.12 (2.38-7.11)	<0.001
Burnout				
Burned-out versus not burned-out	1.29 (0.90-1.83)	0.165	1.22 (0.63-2.34)	0.555
Empathy quartiles x burnout				
2 nd quartile versus 1 st x burnout			1.10 (0.43-2.83)	0.840
3 rd quartile versus 1 st x burnout			1.35 (0.50-3.66)	0.560
4 th quartile versus 1 st x burnout			0.84 (0.30-2.30)	0.728

¹ Model 1 included sex, age, practice organisation and burnout as covariates; ² Model 2 included the same covariates as model 1 besides interaction variables between empathy quartiles and burnout; ³ Empathy quartiles were represented as three dummy variables with 1st (lowest) quartile serving as the reference group.

DISCUSSION

Main findings

This study supported our hypothesis with a robust linear association between increased empathy score and increased use of gut feelings, even when adjusting for the influence of possible confounders such as sex, age, practice organisation and burnout. Compared with GPs in the lowest empathy quartile, GPs in the highest quartile reported fourfold increased use of gut feelings. The predicted probability of using gut feelings to a very high degree was 28% for GPs scoring in the highest quartile of the empathy scale and only 9% of GPs scoring in the lowest quartile of the scale. The results of the study did neither support an association between burnout and use of gut feelings nor that the influence of empathy on use of gut feelings was significantly associated with burnout.

Strengths and limitations

One strength of the present study is the use of validated scales for measuring physician empathy and burnout. Moreover, the response rate was relatively high. One limitation of the study is the cross-sectional design based on which causality cannot be determined. The ability to display empathy is not easily measurable by self-report, and the Jefferson Scale of Physician Empathy actually assesses the physician's attitude to empathy more than the actual empathic ability, probably because it is mainly based on a cognitive approach to empathy.[18] To our knowledge, it has not been examined whether the physician's attitude to empathy correlates with his/her actual capacity to understand what another person is experiencing. Therefore, we cannot exclude that the results of this study reveal an association between a positive attitude to empathy and a positive attitude to use of gut feelings rather than an association between empathic abilities and use of gut feelings. Furthermore, the assessment of use of gut feelings was based on a single item, which was developed for use in a previous study.[22] The item was based on a consensus statement on gut feelings obtained by Stolper et al. [5] in a Delphi procedure and pilot-tested,

but not further validated. After our data was collected, a promising 11-item gut feelings questionnaire was published.[21]

Comparisons with existing literature

In the literature, “pattern failure” is often described as a trigger of gut feelings in primary care. According to Stolper et al., GPs are familiar with the normal pattern of their patient’s appearance, e.g. the way the patient normally sits, speaks and looks, and when that normal pattern of appearance changes, it may be a trigger of gut feelings.[6] Likewise, Van den Bruel et al. noted that changes in the behaviour of the parents of the child, e.g. an observation that the mother was unusually anxious compared with previous consultations, was an important trigger of gut feelings in primary care.[1] The findings of our study do not contradict the “pattern failure” as an explanation of what triggers gut feelings in primary care. Meanwhile, the emphasis on pattern failure as a trigger of gut feelings might not justify why physician empathy and use of gut feelings seem to be as strongly associated as revealed in this study. Stolper et al. mention that bodily sensations often accompany gut feelings.[7] The emotional sensations are seen as elicited by the positive or negative quality attached to the experience of for instance a sign, which do not fit into a familiar pattern of a patient, and play as such a guiding role for the GP.[7] It could be hypothesised that highly empathic GPs are more responsive towards their own affective, bodily sensations accompanying gut feelings. It could also be hypothesised that in some instances, gut feelings arise because the highly empathic GP consciously or unconsciously captures patient’s worry expressed through linguistic cues, body language, facial expressions and intonations. In this hypothesis, the affective bodily sensations are not seen as elicited by the gut feeling, but rather as a trigger of gut feelings. Embodied simulation theory describes how individuals understand others’ actions, emotions and sensations through mirror neurons, and has been proposed as a neurobiological basis for automatic, unconscious communication such as projective identification, empathy and transference-countertransference interactions.[23] The hypothesised impact of embodied simulation on GPs’ gut feelings has to be further examined experimentally, since reliable data on this automatic, unconscious communication might not be retrieved through introspection and self-report.

Likewise, we need more knowledge concerning under which circumstances patient worry and patient intuition has credibility and significance.[24]

It has been suggested that medical students should be provided with cases that stimulate their use of intuition and be exposed to teaching which encourage instinctive clinical judgment in patient management and diagnosis.[25] In line with this, discussing gut feelings in traineeship seems to be a favourable way to bring non-analytical reasoning into use for GP trainees.[26] Based on findings from one study showing that relatives' worries can trigger gut feelings [1] and findings of the present study revealing an association between physician empathy and use of gut feelings, we suggest that the role of emotions in the doctor-patient relationship is emphasised within the medical school curriculum. It has been suggested that medical education seems to encourage students not to acknowledge emotions of patients.[27] This view is supported by studies showing that the most common physician responses to patients' expression of worry were biomedical questions, medical explanations and reassurance,[28] and that when patients express negative emotions, the physicians' responses were directed toward the emotional expression in only 32% of the cases.[29] Since patient concern is often expressed indirectly through cues or clues, it would be relevant to examine whether increased sensitivity towards such clues could improve the diagnostic process.[30] Studies have shown that when physicians respond to patients' expressions of negative emotions with statements that allow for or explicitly encourage further discussion of emotion, then clinically relevant information is often elicited.[29] Furthermore, a review concluded that opening up for patient emotions and providing empathic responses may be associated with positive patient outcomes such as reduced distress and increased patient adherence, co-operation and partnership building.[30]

We found no significant association between burnout or any of the three burnout dimensions and use of gut feelings. Certainly, burned-out GPs had approximately 30% increased likelihood of using gut feelings to

a high level compared to GPs who were not burned-out, but the confidence intervals were wide (0.90 to 1.83) suggesting some inconsistency concerning whether burnout increases or decreases use of gut feelings in our sample. In line with this, the consequences of burnout for GPs' interpersonal skills are controversial and findings are mixed.[31, 32] For instance, the results of one study revealed no associations between GPs' level of depersonalisation and their patient-rated interpersonal skills or observed patient-centeredness,[33] whereas another study revealed that GPs with high levels of exhaustion and depersonalisation were more likely to provide opportunities to discuss mental health problems in the consultation compared to GPs with low levels of exhaustion and depersonalisation.[34] The mixed findings may partially be explained by gender differences. Thus in one study, exhausted female GPs had shorter consultations and were less patient-centred than non-exhausted female GPs whereas exhausted male GPs had longer consultations and were more patient-centred than non-exhausted male GPs.[35] The findings of the present study revealing that empathy, but not burnout, is associated with the use of gut feelings might suggest that the use of gut feelings among GPs is more dependent on personality traits than on the current state of the physician. This agrees to results of a focus group study in which GPs themselves experienced that personality traits such as the ability to tolerate risk and uncertainty influenced the way that they handled gut feelings.[6] A link between personality traits and use of gut feelings raises the question about whether the use of gut feelings can be taught or is an innate ability.[25] Although gut feelings appear to relate to certain personality traits, it is important to stress that the one condition may not be responsible for the other and that the link may not be maintained in the future if teaching of gut feeling was included in the medical school curriculum.

We did not find that age of the GP was associated with use of gut feelings. This contradicts with the findings of other studies in which gut feeling was found either more frequently in less experienced physicians compared to senior physicians [1] or more frequently by experienced than by less experienced physicians.[36] Compared to these studies, the participants in our study might have been more homogeneous since virtually all physicians in our study were specialists in general medicine and as such

quite experienced. Moreover, we examined use of gut feelings in general whereas the other two studies examined the use of gut feeling with reference to specific patient cases. Gut feeling has been described as an intuitive feeling that results from unconscious reasoning and comes with experience.[7] Therefore, the results showing less use of gut feeling with increasing experience may appear peculiar.[1] Meanwhile, as stated by the authors, the triggers of a gut feeling may be processed as part of the conscious diagnostic reasoning in the experienced physician and as pre-conscious reasoning in the less experienced physician. The sensitivity and specificity of gut feeling was the same in the experienced and less experienced physicians [1] and more research is needed to determine both the understanding, use and precision of gut feeling in experienced and less experienced physicians.

Solo GPs had significantly greater likelihood of increased use of gut feelings compared to GPs in group practices. This finding may reflect that familiarity with the patient is often reported to increase reliance on gut feelings.[6] Since patient lists are sometimes shared among GPs in group practices, their familiarity with the individual patient may be reduced compared to solo GPs who often have long-lasting relationships with their patients.

Conclusions and implications

There was a positive association between physician empathy and reported use of gut feelings in primary care. Burnout was neither associated with use of gut feelings nor did it act as an effect moderator on the relationship between empathy and use of gut feelings. We hypothesise that transfer of patient concern to the GP may be one of the triggers of gut feelings and more research is needed to determine under which circumstances patient worries can be used as a reliable tool in the diagnostic process. The use of gut feelings, empathy and interpersonal skills should be incorporated into specialty training to support the use of patient emotions as a deliberate tool in the diagnostic process.

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COMPETING INTERESTS

None declared.

CONTRIBUTIONS

AFP, MLI and PV conceptualized the study. AFP analyzed the data and MLI and PV took part in the interpretation of results. AFP wrote the original draft and AFP, MLI and PV contributed to the editing and reviewing of the draft.

DATA SHARING STATEMENT

Requests for access to data should be addressed to the corresponding author.

LEGEND TO FIGURE 1:

The predicted share of GPs in the four gut feeling categories (use of gut feeling to a low, some, high or very high degree) based on their empathy score divided into quartiles.

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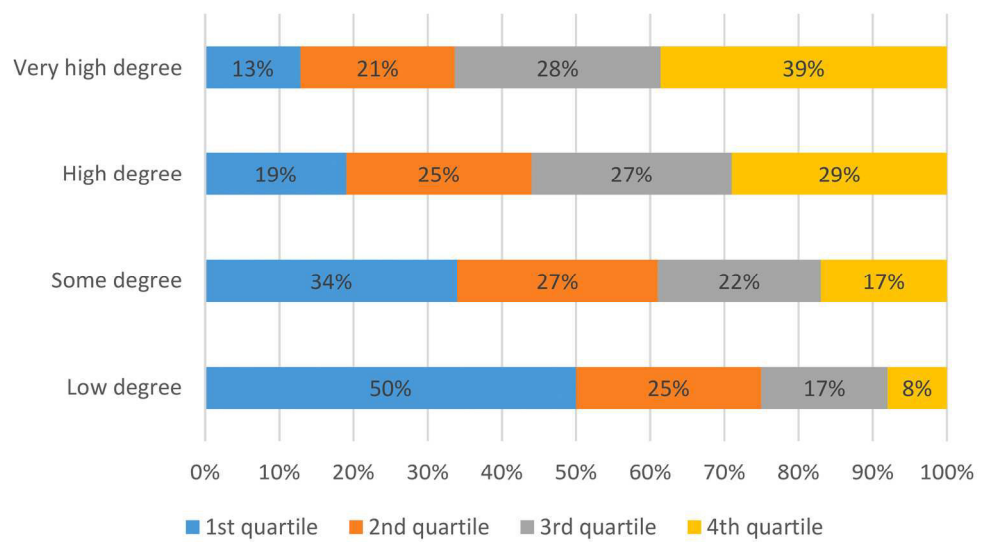
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STROBE 2007 (v4) Statement—Checklist of items that should be included in reports of *cross-sectional studies*

Section/Topic	Item #	Recommendation	Reported on page #
Title and abstract	1	(a) Indicate the study’s design with a commonly used term in the title or the abstract	1
		(b) Provide in the abstract an informative and balanced summary of what was done and what was found	1
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	3-4
Objectives	3	State specific objectives, including any prespecified hypotheses	4
Methods			
Study design	4	Present key elements of study design early in the paper	1
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	5
Participants	6	(a) Give the eligibility criteria, and the sources and methods of selection of participants	5
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	5-6
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	5-6
Bias	9	Describe any efforts to address potential sources of bias	Na
Study size	10	Explain how the study size was arrived at	5
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	Na
Statistical methods	12	(a) Describe all statistical methods, including those used to control for confounding	6-7
		(b) Describe any methods used to examine subgroups and interactions	6-7
		(c) Explain how missing data were addressed	7
		(d) If applicable, describe analytical methods taking account of sampling strategy	Na
		(e) Describe any sensitivity analyses	6
Results			

Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	8
		(b) Give reasons for non-participation at each stage	8
		(c) Consider use of a flow diagram	Na
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	9
		(b) Indicate number of participants with missing data for each variable of interest	9
Outcome data	15*	Report numbers of outcome events or summary measures	9
Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	12
		(b) Report category boundaries when continuous variables were categorized	Na
		(c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	Figure 1
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	11
Discussion			
Key results	18	Summarise key results with reference to study objectives	14
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	14
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	15-17
Generalisability	21	Discuss the generalisability (external validity) of the study results	15-17
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	18

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at <http://www.plosmedicine.org/>, Annals of Internal Medicine at <http://www.annals.org/>, and Epidemiology at <http://www.epidem.com/>). Information on the STROBE Initiative is available at www.strobe-statement.org.

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Empathy, burnout and the use of gut feeling: a cross-sectional survey of Danish general practitioners

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Empathy, burnout and the use of gut feeling: a cross-sectional survey of Danish general practitioners

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ABSTRACT

Objective: Research has suggested that physicians' gut feelings are associated with parents' concerns for the well-being of their children. Gut feeling is particularly important in diagnosis of serious low-incidence diseases in primary care. Therefore, the aim of this study was to examine whether empathy, i.e. the ability to understand what another person is experiencing, relates to general practitioners' (GPs') use of gut feelings. Since empathy is associated with burnout, we also examined whether the hypothesised influence of empathy on gut feeling use is dependent on level of burnout.

Design: Cross-sectional questionnaire survey. Participants completed the Jefferson Scale of Physician Empathy and The Maslach Burnout Inventory.

Setting: Primary care.

Participants: 588 active GPs in Central Denmark Region (response rate=70%)

Primary outcome measure: Self-reported use of gut feelings in clinical practice.

Results: GPs who scored in the highest quartile of the empathy scale had fourfold the odds of increased use of gut feelings compared with GPs in the lowest empathy quartile (OR = 3.99, 95% CI = 2.51-6.34) when adjusting for the influence of possible confounders. Burnout was not statistically significantly associated with use of gut feelings (OR = 1.29, 95% CI = 0.90-1.83), and no significant interaction effects between empathy and burnout were revealed.

Conclusions: Physician empathy, but not burnout, was strongly associated with use of gut feelings in primary care. As preliminary results suggest that gut feelings have diagnostic value, these findings highlight the importance of incorporating empathy and interpersonal skills into medical training to increase sensitivity to patient concern and thereby increase the use and reliability of gut feeling.

STRENGTHS AND LIMITATIONS OF THIS STUDY

- Focus on primary care where diagnosis of serious low-incidence diseases is one of the challenges.
- Use of validated scales for measuring physician empathy and burnout.
- High response rate.
- The cross-sectional design makes causality difficult to determine.
- Inclusion of hard-to-measure variables, such as physician empathy and use of gut feelings.

MeSH keywords: Clinical decision-making, Early diagnosis, Empathy, General practice, Self-report

INTRODUCTION

General practitioners (GPs) sometimes base clinical decisions on their intuition or gut feelings. A limited number of studies have examined the diagnostic value of gut feelings and have shown significant and promising results. One study found a sensitivity of GPs' gut feelings on 62% and a specificity on 97% regarding serious infections in children.[1] Two other studies have reported positive predictive values (PPVs) of GPs' gut feelings on 3-35% concerning diagnoses of cancer.[2, 3] These PPVs are comparable or substantial higher than the PPVs of most cancer alarm symptoms presented in primary care, which are mostly below 3%.[4]

Stolper et al. described two types of gut feeling in GPs: a "sense of alarm" defined as an uneasy feeling indicating concerns about a possible adverse outcome, even though specific indications are lacking and a "sense of reassurance" defined as a feeling of security about the management of a patient's problem, even though the diagnosis may be uncertain.[5, 6] In models of diagnostic reasoning, intuition and analysis are often described as two modes of cognition, which can be placed at the ends of a continuum.[7] Intuition comprises automatic, unconscious reasoning requiring low effort (system 1 decision-making), whereas analysis comprises controlled, conscious reasoning requiring high effort (system 2 decision-making).[8] There seems to be consensus that gut feelings belong to the intuition end of the reasoning continuum, but the emphasis on lack of specific indications or objective arguments regarding in the sense of alarm as described in the Stolper definition [6] is less clear in studies of gut feelings. For instance, in studies of gut feelings among emergency physicians, potential red flag vital signs were included in assessment of patients.[8, 9]. Moreover, in another study, red flag symptoms such as palpable tumours were reported to be triggers of gut feelings.[2] We cannot rule out that the physician has a gut feeling, but in such cases the clinical decision-making will probably also be based on conscious, rule-based reasoning saying that palpable tumours could potentially be malignant. One study of children examined for serious infections explicitly approached gut feelings as an intuitive feeling, which could arise despite that the clinical impression

suggests a non-serious illness and found that parents' worry was an important trigger of GPs' gut feelings in children with no red flag symptoms.[1] Thus, parental concern was registered in 33% of cases where gut feeling was present despite that the clinical impression was that of a non-serious illness and in only 2% of similar non-serious cases where gut feeling was absent.

It varies greatly to what extent the individual GP uses gut feelings.[2] This might suggest that the use of gut feelings relate to the GP's personality.[6] Insofar the emotional state of the patient or his/her relatives is a trigger of gut feelings as proposed by the study above, physician empathy might be a determinant of the use of gut feelings. There is disagreement about the definition of empathy. In the medical context, empathy is often considered as a cognitive quality encompassing an understanding of the patient's experience and concerns and an ability to communicate this understanding and an intention to help.[10] However, in other areas the emotional feeling is the focal point in the definition of empathy and empathy is considered as an effective response to the emotions of others.[11]

Some GPs will congenitally be less empathic than others, but one group of GPs may initially have possessed good empathic skills which have then later on been reduced due to burnout, which has been referred to as an "empathy killer".[12] Burnout is a psychological construct defined as a prolonged response to chronic emotional and interpersonal stressors on the job and is characterized by emotional exhaustion, depersonalization (cynicism) and a subjective experience of decreased personal accomplishment.[13] Burnout seems to be associated with empathy in a complex, bidirectional manner.[12] Thus, burnout has been associated with low levels of empathy.[14] On the other side, deficits in perspective taking appear to be a risk factor for burnout, whereas increased perspective taking and empathic concern seem to be protective against burnout.[15, 16]

On this background, we hypothesised that GPs who report high levels of empathy report higher use of gut feelings in their clinical work and that this hypothesised effect of empathy on use of gut feelings depends on the presence of burnout.

METHODS

Setting

GPs in Denmark are independent contractors with the regional health authorities. The patient list size is on average 1550 patients per GP including children. All Danish citizens are assigned a unique personal identification number, the civil registration number (CRN), by which information from numerous nationwide registers in Denmark can be linked.[17]

Study population

In January 2012, all 835 active GPs in Central Denmark Region were invited to participate in a survey on job satisfaction ("the GP profile"). GPs were identified by the Regional Registry of Health Providers. Non-respondents were sent a reminder after four and thirteen weeks and GPs were remunerated 50€ for responding. In Denmark, it is customary to compensate doctors for their time when they participate in research projects.

Questionnaires – independent variables and effect modifier

Empathy was assessed by the Jefferson Scale of Physician Empathy (JSPE) consisting of 20 items scored on a 7-point Likert scale.[18] Higher sum-scores indicate higher levels of empathy. In this study, the empathy sum-score was categorized into four groups based on its quartiles.

Burnout was assessed by The Maslach Burnout Inventory Human-Services-Survey (MBI-HSS) [13]. The MBI-HSS has been used in more than 90% of empirical studies of burnout in the world.[19] The scale has been translated into Danish following standardised procedures. The MBI-HSS consists of 22 items scored on a 7-point Likert scale constituting three subscales: 1) emotional exhaustion (9 items), 2) depersonalisation (5 items), and 3) personal accomplishment (8 items). Each subscale score is categorised as low or high based

on normative population score.[13] A high level of emotional exhaustion is defined as a score >26, and a high level of depersonalisation is defined as a score >9. Low personal accomplishment is defined as a score <34. Burnout was defined as a high score on the emotional exhaustion subscale and/or a high score on the depersonalisation subscale.[13]

Both the JSPE and MBI-HSS were translated into Danish in accordance with the WHO guidelines.[20] The translation process included a forward translation and an expert panel back-translation and pilot testing of translated version.

Single item – the outcome variable

A definition of gut feeling, based on Stolper’s work,[21] was included in the questionnaire and was as follows: “a physician’s intuitive feeling that something is wrong with the patient although there is no apparent clinical indications for this, or a physician’s intuitive feeling that the strategy used in relation to the patient is correct, although there is uncertainty about the diagnosis”. The GPs were asked to rate how much they use gut feelings in their daily clinical work and the response was graded on a 5-point Likert scale from “not at all” to “a very high degree”. The question was inspired by a former Danish study on use of gut feelings.[22]

According to Danish law the study was not submitted to an ethical committee since questionnaire surveys do not require an ethical approval. The study was approved by the Danish Data Protection Agency (journal number 2011-41-6609).

Analysis

The outcome variable (use of gut feelings) was assessed on an ordinal scale (from not at all to a very high degree). After confirming that the proportional odds assumption was met, ordered logistic regression was used to examine associations between empathy, burnout dimensions and use of gut feelings. Associations

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4 were calculated as odd ratios (ORs). To test for an association between empathy and use of gut feeling and
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6 whether the association was dependent on presence of burnout (i.e. interaction effect), one hierarchical
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8 ordered logistic regression analysis was performed. In the first step (model 1), sex, age, practice
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10 organisation and burnout were included as covariates. In the second step (model 2), the interaction
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12 variables between empathy quartiles and burnout were included. To assist interpretation of results,
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14 predicted probabilities for empathy quartiles were calculated. As a sensitivity analysis, three separate
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16 hierarchical ordered logistic regression analyses were performed adjusting for the three burnout
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18 dimensions (emotional exhaustion, depersonalisation and reduced personal accomplishment) individually.
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20 We handled missing data by listwise deletion. The 95% confidence intervals (95% CI) for ratios were
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22 calculated and p-values of 5% or less were considered statistically significant. Data was analysed using
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RESULTS

Among the 835 invited GPs, 588 (70%) completed the question about use of gut feelings in their clinical practice. Among the 588 included GPs, there was a slight predominance of male GPs (52%) and the majority of GPs worked in group practices (76%). One GP reported not to use gut feelings and this GP was added to the 20 (3%) GPs who reported that they used gut feelings to a low degree. Respectively 254 (43%), 211 (36%) and 102 (17%) reported that they used gut feelings to some degree, a high degree and a very high degree. Sociodemographic characteristics of the 588 included GPs are depicted in Table 1.

Table 1. Demographic characteristics and scores on burnout dimensions and empathy by gut feeling categories

	All N = 588 (100%)	Use of gut feelings:			
		To a low degree N = 21 (3.6%)	To some degree N = 254 (43.2%)	To a high degree N = 211 (35.9%)	To a very high degree N = 102 (17.3%)
	N (%)	N (%)	N (%)	N (%)	N (%)
Sex					
Female	278 (47.3)	5 (23.8)	126 (50.2)	94 (44.8)	53 (52.0)
Male	306 (52.0)	16 (76.2)	125 (49.8)	116 (55.2)	49 (48.0)
Practice organisation					
Group	445 (75.7)	15 (71.4)	207 (81.5)	157 (74.4)	66 (64.7)
Solo	143 (24.3)	6 (28.6)	47 (18.5)	54 (25.6)	36 (35.3)
Age of GPs (years)					
< 40	39 (6.6)	2 (9.5)	19 (7.5)	14 (6.6)	4 (3.9)
40-49	183 (31.1)	3 (14.3)	75 (29.5)	66 (31.3)	39 (38.2)
50-59	226 (38.4)	9 (42.9)	98 (38.6)	78 (37.0)	41 (40.2)
≥ 60	138 (23.5)	7 (33.3)	61 (24.0)	52 (24.6)	18 (17.7)
Empathy					
Lowest quartile	154 (26.2)	12 (57.1)	83 (32.7)	46 (21.8)	13 (12.8)
2 nd quartile	145 (24.7)	4 (19.1)	70 (27.6)	49 (23.2)	22 (21.6)
3 rd quartile	129 (21.9)	0 (0.0)	53 (20.9)	51 (24.2)	25 (24.5)
Highest quartile	129 (21.9)	3 (14.3)	35 (13.8)	53 (25.1)	38 (37.3)
Burnout					
No burnout	441 (75.0)	20 (95.2)	192 (75.6)	146 (69.2)	83 (81.4)
Burnout	147 (25.0)	1 (4.8)	62 (24.4)	65 (30.8)	19 (18.6)
Emotional exhaustion					
Low	479 (81.5)	19 (90.5)	212 (83.5)	164 (77.7)	84 (82.4)
High	102 (17.4)	1 (4.8)	39 (15.4)	46 (21.8)	16 (15.7)
Depersonalisation					
Low	503 (85.5)	19 (90.5)	219 (86.2)	172 (81.5)	93 (91.2)
High	81 (13.8)	1 (4.8)	33 (13.0)	38 (18.0)	9 (8.8)
Personal accomplishment					
High	377 (64.1)	14 (66.7)	157 (61.8)	133 (63.0)	73 (71.6)
Low	201 (34.2)	6 (28.6)	92 (36.2)	76 (36.0)	27 (26.5)

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Values may not total 100 due to rounding or missing information

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The empathy sum-score correlated negatively with emotional exhaustion ($r = -0.13$; $p = 0.003$), depersonalisation ($r = -0.24$; $p < 0.001$) and positively with personal accomplishment ($r = 0.43$; $p < 0.001$).

Table 2 depicts associations between gut feelings and sociodemographic factors, the three burnout dimensions and empathy. A linear relationship between empathy and use of gut feelings was revealed when adjusting for sex, age, practice organisation and burnout. Thus, compared with GPs in the lowest empathy quartile, GPs in the highest quartile had fourfold the likelihood of increased use of gut feelings ($OR_{\text{model 1}} = 3.99$, 95% CI = 2.51-6.34).

Figure 1 shows the predicted probabilities of being in each of the four gut feeling categories in relation to level of empathy score. The pattern of those in the lowest and highest quartiles of the empathy sum-score is opposite. Thus, 50% of those in the lowest quartile of the empathy sum-score uses gut feelings to a low degree and only 13% of participants in this group uses gut feelings to a very high degree. Opposite this, only 8% of those in the highest quartile of the empathy sum-score uses gut feelings to a low degree whereas 39% of this group uses gut feelings to a very high degree.

Burnout was not significantly associated with use of gut feelings ($OR_{\text{model 1}} = 1.29$, 95% CI = 0.90-1.83) and the results did not reveal a significant interaction between burnout and empathy on the use of gut feelings (Table 2). Including each of the three burnout dimensions individually in the sensitivity analysis did not reveal a main effect of any of the three burnout dimensions on use of gut feelings (data not shown; OR_{high} emotional exhaustion versus low = 1.41, 95% CI = 0.94-2.11; OR_{high} depersonalisation versus low = 1.32, 95% CI = 0.89-2.04; OR_{low} personal accomplishment versus high = 1.21, 95% CI = 0.86-1.72). Including each of the three burnout dimensions individually did not either support a moderating effect of any of the three burnout dimensions (data not shown; p-values 0.336-0.923).

Solo GPs had significantly greater likelihood of increased use of gut feelings compared to GPs in group practices ($OR_{\text{model 2}} = 1.86$, 95% CI = 1.25-2.75).

Table 2. Summary of a hierarchical ordered logistic regression analysis with gut feeling categories used as outcome

	Model 1 ¹		Model 2 ²	
	OR (95% CI)	P-value	OR (95% CI)	P-value
Sex				
Males versus females	0.88 (0.63-1.24)	0.473	0.87 (0.62-1.23)	0.435
Age	0.98 (0.96-1.00)	0.101	0.98 (0.96-1.00)	0.107
Practice organisation				
Solo practice versus group practice	1.82 (1.23-2.69)	0.003	1.86 (1.25-2.75)	0.002
Empathy ³				
2 nd quartile versus 1 st	1.76 (1.13-2.74)	0.012	1.71 (0.99-2.94)	0.054
3 rd quartile versus 1 st	2.47 (1.57-3.89)	<0.001	2.29 (1.33-3.93)	0.003
4 th quartile versus 1 st	3.99 (2.51-6.34)	<0.001	4.12 (2.38-7.11)	<0.001
Burnout				
Burned-out versus not burned-out	1.29 (0.90-1.83)	0.165	1.22 (0.63-2.34)	0.555
Empathy quartiles x burnout				
2 nd quartile versus 1 st x burnout			1.10 (0.43-2.83)	0.840
3 rd quartile versus 1 st x burnout			1.35 (0.50-3.66)	0.560
4 th quartile versus 1 st x burnout			0.84 (0.30-2.30)	0.728

¹ Model 1 included sex, age, practice organisation and burnout as covariates; ² Model 2 included the same covariates as model 1 besides interaction variables between empathy quartiles and burnout; ³ Empathy quartiles were represented as three dummy variables with 1st (lowest) quartile serving as the reference group.

DISCUSSION

Main findings

This study supported our hypothesis with a robust linear association between increased empathy score and increased use of gut feelings, even when adjusting for the influence of possible confounders such as sex, age, practice organisation and burnout. Compared with GPs in the lowest empathy quartile, GPs in the highest quartile reported fourfold increased use of gut feelings. The predicted probability of using gut feelings to a very high degree was 28% for GPs scoring in the highest quartile of the empathy scale and only 9% of GPs scoring in the lowest quartile of the scale. The results of the study did neither support an association between burnout and use of gut feelings nor that the influence of empathy on use of gut feelings was significantly associated with burnout.

Strengths and limitations

One strength of the present study is the use of validated scales for measuring physician empathy and burnout. Moreover, the response rate was relatively high. One limitation of the study is the cross-sectional design based on which causality cannot be determined. The ability to display empathy is not easily measurable by self-report, and the Jefferson Scale of Physician Empathy actually assesses the physician's attitude to empathy more than the actual empathic ability, probably because it is mainly based on a cognitive approach to empathy.[18] To our knowledge, it has not been examined whether the physician's attitude to empathy correlates with his/her actual capacity to understand what another person is experiencing. Therefore, we cannot exclude that the results of this study reveal an association between a positive attitude to empathy and a positive attitude to use of gut feelings rather than an association between empathic abilities and use of gut feelings. Furthermore, the assessment of use of gut feelings was based on a single item, which was developed for use in a previous study.[22] The item was based on a consensus statement on gut feelings obtained by Stolper et al. [5] in a Delphi procedure and pilot-tested,

but not further validated. After our data was collected, a promising 11-item gut feelings questionnaire was published.[21]

Comparisons with existing literature

In the literature, “pattern failure” is often described as a trigger of gut feelings in primary care. According to Stolper et al., GPs are familiar with the normal pattern of their patient’s appearance, e.g. the way the patient normally sits, speaks and looks, and when that normal pattern of appearance changes, it may be a trigger of gut feelings.[6] Likewise, Van den Bruel et al. noted that changes in the behaviour of the parents of the child, e.g. an observation that the mother was unusually anxious compared with previous consultations, was an important trigger of gut feelings in primary care.[1] The findings of our study do not contradict the “pattern failure” as an explanation of what triggers gut feelings in primary care. Meanwhile, the emphasis on pattern failure as a trigger of gut feelings might not justify why physician empathy and use of gut feelings seem to be as strongly associated as revealed in this study. Stolper et al. mention that bodily sensations often accompany gut feelings.[23] The emotional sensations are seen as elicited by the positive or negative quality attached to the experience of for instance a sign, which do not fit into a familiar pattern of a patient, and play as such a guiding role for the GP.[23] Although Stolper et al. during a Delphi procedure to reach consensus on the understanding of gut feelings stressed that gut feelings are not about empathy towards the patient,[5] it could be hypothesised that highly empathic GPs are more responsive towards their own affective, bodily sensations accompanying gut feelings. It could also be hypothesised that in some instances, gut feelings arise because the highly empathic GP consciously or unconsciously captures patient’s worry expressed through linguistic cues, body language, facial expressions and intonations. In this hypothesis, the affective bodily sensations are not seen as elicited by the gut feeling, but rather as a trigger of gut feelings. Embodied simulation theory describes how individuals understand others’ actions, emotions and sensations through mirror neurons, and has been proposed as a neurobiological basis for automatic, unconscious communication such as projective identification, empathy and transference-countertransference interactions.[24] The hypothesised impact of embodied simulation

on GPs' gut feelings has to be further examined experimentally, since reliable data on this automatic, unconscious communication might not be retrieved through introspection and self-report.

Likewise, we need more knowledge concerning under which circumstances patient worry and patient intuition has credibility and significance.[25]

It has been suggested that medical students should be provided with cases that stimulate their use of intuition and be exposed to teaching which encourage instinctive clinical judgment in patient management and diagnosis.[26] In line with this, discussing gut feelings in traineeship seems to be a favourable way to bring non-analytical reasoning into use for GP trainees.[27] Based on findings from one study showing that relatives' worries can trigger gut feelings [1] and findings of the present study revealing an association between physician empathy and use of gut feelings, we suggest that the role of emotions in the doctor-patient relationship is emphasised within the medical school curriculum. It has been suggested that medical education seems to encourage students not to acknowledge emotions of patients.[28] This view is supported by studies showing that the most common physician responses to patients' expression of worry were biomedical questions, medical explanations and reassurance,[29] and that when patients express negative emotions, the physicians' responses were directed toward the emotional expression in only 32% of the cases.[30] Since patient concern is often expressed indirectly through cues or clues, it would be relevant to examine whether increased sensitivity towards such clues could improve the diagnostic process.[31] Studies have shown that when physicians respond to patients' expressions of negative emotions with statements that allow for or explicitly encourage further discussion of emotion, then clinically relevant information is often elicited.[30] Furthermore, a review concluded that opening up for patient emotions and providing empathic responses may be associated with positive patient outcomes such as reduced distress and increased patient adherence, co-operation and partnership building.[31]

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We found no significant association between burnout or any of the three burnout dimensions and use of gut feelings. Certainly, burned-out GPs had approximately 30% increased likelihood of using gut feelings to a high level compared to GPs who were not burned-out, but the confidence intervals were wide (0.90 to 1.83) suggesting some inconsistency concerning whether burnout increases or decreases use of gut feelings in our sample. In line with this, the consequences of burnout for GPs’ interpersonal skills are controversial and findings are mixed.[32, 33] For instance, the results of one study revealed no associations between GPs’ level of depersonalisation and their patient-rated interpersonal skills or observed patient-centeredness,[34] whereas another study revealed that GPs with high levels of exhaustion and depersonalisation were more likely to provide opportunities to discuss mental health problems in the consultation compared to GPs with low levels of exhaustion and depersonalisation.[35] The mixed findings may partially be explained by gender differences. Thus in one study, exhausted female GPs had shorter consultations and were less patient-centred than non-exhausted female GPs whereas exhausted male GPs had longer consultations and were more patient-centred than non-exhausted male GPs.[36] The findings of the present study revealing that empathy, but not burnout, is associated with the use of gut feelings might suggest that the use of gut feelings among GPs is more dependent on personality traits than on the current state of the physician. This agrees to results of a focus group study in which GPs themselves experienced that personality traits such as the ability to tolerate risk and uncertainty influenced the way that they handled gut feelings.[6] A link between personality traits and use of gut feelings raises the question about whether the use of gut feelings can be taught or is an innate ability.[26] Although gut feelings appear to relate to certain personality traits, it is important to stress that the one condition may not be responsible for the other and that the link may not be maintained in the future if teaching of gut feeling was included in the medical school curriculum.

We did not find that age of the GP was associated with use of gut feelings. This contradicts with the findings of other studies in which gut feeling was found either more frequently in less experienced physicians compared to senior physicians [1] or more frequently by experienced than by less experienced

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4 physicians.[37] Compared to these studies, the participants in our study might have been more
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6 homogeneous since virtually all physicians in our study were specialists in general medicine and as such
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8 quite experienced. Moreover, we examined use of gut feelings in general whereas the other two studies
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10 examined the use of gut feeling with reference to specific patient cases. Gut feeling has been described as
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12 an intuitive feeling that results from unconscious reasoning and comes with experience.[23] Therefore, the
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14 results showing less use of gut feeling with increasing experience may appear peculiar.[1] Meanwhile, as
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16 stated by the authors, the triggers of a gut feeling may be processed as part of the conscious diagnostic
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18 reasoning in the experienced physician and as pre-conscious reasoning in the less experienced physician. In
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20 this study, the sensitivity and specificity of gut feeling was the same in the experienced and less
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22 experienced physicians,[1] but the results of another study revealed that the PPV of cancer-related gut
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24 feeling increased with 3% for every year a GP becomes older.[2] Taken together, more research is needed
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26 to determine both the understanding, use and precision of gut feeling in experienced and less experienced
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28 physicians.
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31 Solo GPs had significantly greater likelihood of increased use of gut feelings compared to GPs in group
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33 practices. This finding may reflect that familiarity with the patient is often reported to increase reliance on
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35 gut feelings.[6] Since patient lists are sometimes shared among GPs in group practices, their familiarity with
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37 the individual patient may be reduced compared to solo GPs who often have long-lasting relationships with
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39 their patients.
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42 **Conclusions and implications**

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45 There was a positive association between physician empathy and reported use of gut feelings in primary
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47 care. Burnout was neither associated with use of gut feelings nor did it act as an effect moderator on the
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49 relationship between empathy and use of gut feelings. We hypothesise that transfer of patient concern to
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51 the GP may be one of the triggers of gut feelings and more research is needed to determine under which
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53 circumstances patient worries can be used as a reliable tool in the diagnostic process. The use of gut
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feelings, empathy and interpersonal skills should be incorporated into specialty training to support the use of patient emotions as a deliberate tool in the diagnostic process.

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COMPETING INTERESTS

None declared.

CONTRIBUTIONS

AFP, MLI and PV conceptualized the study. AFP analyzed the data and MLI and PV took part in the interpretation of results. AFP wrote the original draft and AFP, MLI and PV contributed to the editing and reviewing of the draft.

DATA SHARING STATEMENT

Requests for access to data should be addressed to the corresponding author.

LEGEND TO FIGURE 1:

The predicted share of GPs in the four gut feeling categories (use of gut feeling to a low, some, high or very high degree) based on their empathy score divided into quartiles.

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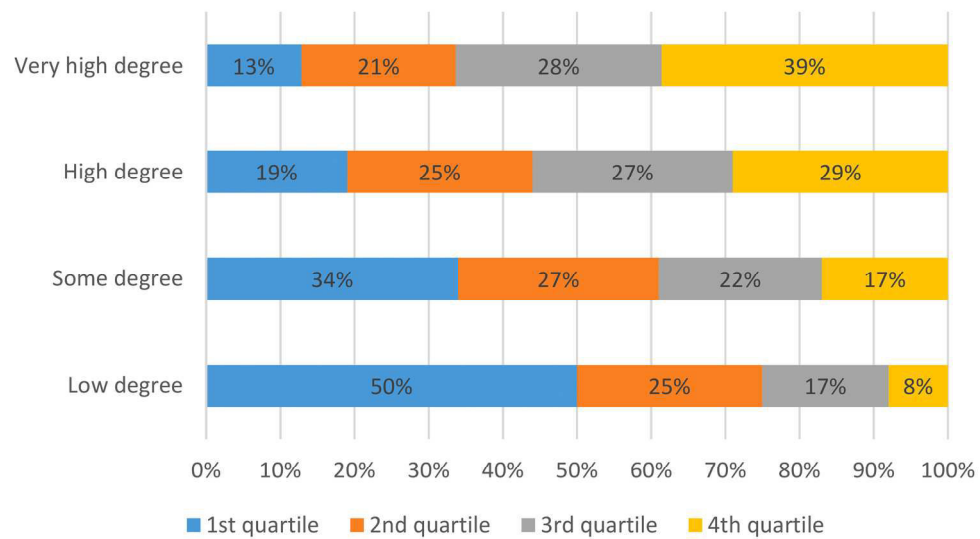
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STROBE 2007 (v4) Statement—Checklist of items that should be included in reports of *cross-sectional studies*

Section/Topic	Item #	Recommendation	Reported on page #
Title and abstract	1	(a) Indicate the study’s design with a commonly used term in the title or the abstract	1
		(b) Provide in the abstract an informative and balanced summary of what was done and what was found	1
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	3-4
Objectives	3	State specific objectives, including any prespecified hypotheses	4
Methods			
Study design	4	Present key elements of study design early in the paper	1
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	5
Participants	6	(a) Give the eligibility criteria, and the sources and methods of selection of participants	5
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	5-6
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	5-6
Bias	9	Describe any efforts to address potential sources of bias	Na
Study size	10	Explain how the study size was arrived at	5
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	Na
Statistical methods	12	(a) Describe all statistical methods, including those used to control for confounding	6-7
		(b) Describe any methods used to examine subgroups and interactions	6-7
		(c) Explain how missing data were addressed	7
		(d) If applicable, describe analytical methods taking account of sampling strategy	Na
		(e) Describe any sensitivity analyses	6
Results			

Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	8
		(b) Give reasons for non-participation at each stage	8
		(c) Consider use of a flow diagram	Na
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	9
		(b) Indicate number of participants with missing data for each variable of interest	9
Outcome data	15*	Report numbers of outcome events or summary measures	9
Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	12
		(b) Report category boundaries when continuous variables were categorized	Na
		(c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	Figure 1
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	11
Discussion			
Key results	18	Summarise key results with reference to study objectives	14
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	14
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	15-17
Generalisability	21	Discuss the generalisability (external validity) of the study results	15-17
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	18

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at <http://www.plosmedicine.org/>, Annals of Internal Medicine at <http://www.annals.org/>, and Epidemiology at <http://www.epidem.com/>). Information on the STROBE Initiative is available at www.strobe-statement.org.